

PTO/SB/17 (01-06)  
Approved for use through 07/31/2006, OMB 0651-0032  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE  
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

## FEE TRANSMITTAL For FY 2006

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 0.00

### Complete if Known

Application Number	11/095,154
Filing Date	March 31, 2005
First Named Inventor	Sotos
Examiner Name	Patricia C. Mallari
Art Unit	3736
Attorney Docket No.	APN-005

### METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): \_\_\_\_\_  
☐ Deposit Account Deposit Account Number: \_\_\_\_\_ Deposit Account Name: \_\_\_\_\_  
For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)  
☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee  
☐ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☐ Credit any overpayments

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

### FEE CALCULATION (All the fees below are due upon filing or may be subject to a surcharge.)

#### 1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

#### 2. EXCESS CLAIM FEES

##### Fee Description

	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims Extra Claims Fee (\$) Fee Paid (\$)  
21 - 20 or HP = 1 x 25 = 25 (paid previously)

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims Extra Claims Fee (\$) Fee Paid (\$)

3 or HP = x =

HP = highest number of independent claims paid for, if greater than 3.

#### 3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets Extra Sheets Number of each additional 50 or fraction thereof Fee (\$) Fee Paid (\$)  
- 100 = / 50 = (round up to a whole number) x =

#### 4. OTHER FEE(S)

Color drawings: \$130 (paid previously) Fees Paid (\$)

Non-English Specification, \$130 fee (no small entity discount)

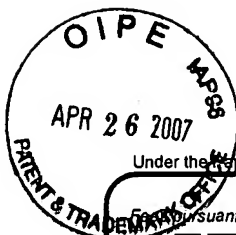
Other (e.g., late filing surcharge):

#### SUBMITTED BY

Signature		Registration No. (Attorney/Agent)	Telephone 650-325-5675
Name (Print/Type)	John G. Sotos		Date 22 April 2007

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



PTO/SB/17 (01-06)  
Approved for use through 07/31/2006. OMB 0651-0032  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number

Complete if Known

Application Number 11/095,154

Filing Date March 31, 2005

First Named Inventor Sotos

Examiner Name Patricia C. Mallari

Art Unit 3736

Attorney Docket No. APN-005

Under the Paperwork Reduction Act of 1995 (H.R. 4818).

# FEE TRANSMITTAL

## For FY 2006

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 0.00

### METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): \_\_\_\_\_

☐ Deposit Account Deposit Account Number: \_\_\_\_\_ Deposit Account Name: \_\_\_\_\_

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee

☐ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☐ Credit any overpayments

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

### FEE CALCULATION (All the fees below are due upon filing or may be subject to a surcharge.)

#### 1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	_____
Design	200	100	100	50	130	65	_____
Plant	200	100	300	150	160	80	_____
Reissue	300	150	500	250	600	300	_____
Provisional	200	100	0	0	0	0	_____

#### 2. EXCESS CLAIM FEES

##### Fee Description

	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims Extra Claims Fee (\$) Fee Paid (\$)  
21 - 20 or HP = 1 x 25 = 25 (paid previously)

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims Extra Claims Fee (\$) Fee Paid (\$)  
- 3 or HP = x =

HP = highest number of independent claims paid for, if greater than 3.

#### 3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets Extra Sheets Number of each additional 50 or fraction thereof Fee (\$) Fee Paid (\$)  
- 100 = / 50 = (round up to a whole number) x =

#### 4. OTHER FEE(S)

Color drawings: \$130 (paid previously) Fees Paid (\$)

Non-English Specification, \$130 fee (no small entity discount)

Other (e.g., late filing surcharge): \_\_\_\_\_

#### SUBMITTED BY

Signature		Registration No. (Attorney/Agent)	Telephone 650-325-5675
Name (Print/Type)	John G. Sotos		Date 22 April 2007

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



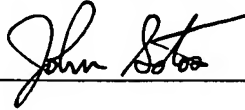
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

**APPLICANT:** John Sotos, et al.  
**APPLICATION NO.:** 11/095,154  
**FILING DATE:** March 31, 2005  
**TITLE:** System and Method for Visualizing Sleep-Related Information  
**EXAMINER:** Patricia C. Mallari  
**ART UNIT:** 3736

---

**CERTIFICATE OF MAILING**

I hereby certify that this paper is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, PO Box 1450, Alexandria, Virginia 22313-1450, on **April 22, 2007**.



---

---

MAIL STOP AMENDMENT  
COMMISSIONER FOR PATENTS  
P.O. BOX 1450  
ALEXANDRIA, VA 22313-1450

**AMENDMENT B**

Assistant Commissioner for Patents  
Alexandria, VA 22313

Sir:

In response to the communication mailed March 26, 2007, please amend the above application as follows. The present amendments are substantially the same as those submitted by applicants on October 31, 2006 except that: (a) all claims are listed, including

cancelled and withdrawn claims, and (b) the amendments to the specification refer to paragraph numbers in applicant's originally submitted application (March 31, 2005).

Applicants summarize recent communications as follows:

- Mar. 26, 2007: USPTO to Applicants,
- Dec. 19, 2006: Applicants to USPTO,
- Nov. 20, 2006: USPTO to Applicants,
- Oct. 31, 2006: Applicants to USPTO,
- Aug. 1, 2006: USPTO to Applicants,
- May 7, 2006: Applicants to USPTO,
- Feb. 7, 2006: USPTO to Applicants (Office Action).

Amendments to the specification (including drawings) begin on page 3 whereas amendments to the claims begin on page 7. The Applicants' remarks begin on page 21. The Applicants' conclusion commences on page 25.

It is unclear from the communication of August 1, 2006 whether the amendment submitted on May 7, 2006 was entered. Accordingly, Applicants hereby resubmit the changes to the specification contained in that proposed Amendment, along with a further amendment to the specification.

In addition, the color drawings that were submitted in hardcopy in triplicate on May 7, 2006 have not been physically resubmitted, as Applicants assume those submitted on May 7 remain physically accessible to the Examiner. Applicants remitted fees (\$130) connected with these color drawings on May 7, 2006; therefore, no additional fees related to color drawings are remitted today.

Finally, applicant notes that fees sufficient to cover the charges for examination of 21 claims (\$25) were submitted on May 7, 2006. No additional fees related to examination of claims are remitted today.

**In the Specification:**

1. On page 5, amend paragraph 2 as follows:

Some reduced sensor devices collect sound as a physiological parameter for use in assessing breathing disorders of sleep, as taught in co-pending U.S. ~~Patent~~ Patent Application titled "~~System and Method for Assessing Breathing~~" and submitted by John G. Sotos, John L. Branseum Jr., and Patricia H. Branseum simultaneously with the present disclosure No. 11/094,911. One factor in the visualization of digitized sound data is the high typical sampling rate, e.g. 2000 samples per second. Thus, in an 8-hour period, over 57 million sound samples may be collected. Although this may be considered a large data set in many visualization applications, there are several examples where signals similar to raw sound are plotted on a common time axis with other physiological signals.

2. On page 6, add the following paragraph after the header "BRIEF DESCRIPTION OF THE DRAWINGS" and before the first sentence of paragraph 6 ("Figures 1A and 1B illustrate a visualization of polysomnographic information.") so that this added paragraph becomes the first paragraph under the header "BRIEF DESCRIPTION OF THE DRAWINGS:"

The patent or application file contains at least one drawing executed in color. Copies of this patent or patent application publication with color drawing(s) will be provided by the Office upon request and payment of the necessary fee.

3. On page 7, amend paragraph 5 as follows (note: the figure descriptions and the parenthesized note are being counted as paragraphs; thus, paragraph 5 is the first paragraph that appears under the header "Description of the Specific Embodiment):

Fig. 3 shows a flow diagram of steps in communicating physiological information about a human or otherwise mammalian patient. In one method, in data collection step 310 a device may acquire physiological data from a patient who is sleeping (or attempting to sleep): The device may be a polysomnographic device or a reduced sensor device, e.g. as taught in co-pending U.S. Patent Application titled "System and Method for Assessing Breathing" and submitted by John G. Sotos, John L. Branseum Jr., and Patricia H. Branseum simultaneously with the present disclosure No. 11/094,911. In step 320 the data collected in step 310 may be converted to digital format, e.g. with an analog-to-digital converter.

4. On page 10, amend paragraph 3 as follows:

In another embodiment the horizontal lines 412 representing body position may do so according to a code. For example, the presence of three lines (412a, 412b, 412c) at a specific time may indicate the patient, while lying in bed, was facing upwards at that time. The presence of one line (412a) may indicate the patient is facing down, and the presence of two lines may indicate the patient is on his or her side (412a and 412c for facing left, and 412b and 412c for facing right). Applying this code to Fig. 4A discloses that the patient was on his or her back for approximately the first 0.44 minutes, before assuming a left-facing position.

5. On page 10, amend paragraph 4 as follows:

In another embodiment body position may be represented by icons arrayed in a horizontal line near the top of pane 400, such that an icon plotted at a time  $t$  (per horizontal axis 402) would represent the patient's body position in bed at that time  $t$ . In one embodiment the icons are arrowheads facing up, down, left, and right with respect to pane 400, representing, respectively, the patient facing up, down, left, and right.

6. Amend the paragraph straddling pages 10 and 11 (i.e. "paragraph 5 on page 10" and "paragraph 1 on page 11" both refer to this paragraph) as follows:

The technique of representing body position in a vertically small extent, as shown, for example, in Fig. 4A, may potentially be applied to any graph in which the representation of body position is desired. In one embodiment a body position datum may assume relatively few values, e.g. up, down, left, right, facilitating the use of coding approaches, as above. Sleep/wake stage is another physiological variable that in some embodiments can assume relatively few values, e.g. wakefulness, rapid eye movement (REM) sleep, and ~~stages 1, 2, 3, and 4 sleep~~ stages one, two, three, and four sleep. As a result of this similarity between body position and sleep/wake stage, in one embodiment sleep/wake stage may be ~~amendable~~ amenable to one or more of the visualization techniques applied to body position.

7. On page 14, amend paragraph 3 as follows:

We will temporarily focus our discussion of Fig. 6A on the "facing right" quadrant. Each position's sector may include, but is not limited to, a caption 610, a quantity label 620, a histogram bar ~~[[630]]~~ 640, and a comparison circle ~~[[640]]~~ 630. Caption 610 may generally be a word or two that explains which position is displayed. Quantity label 620 may generally be a number corresponding to the value of the graph's parameter for the given position. Histogram bar 640 may be akin to the bars on a standard histogram, but with a different orientation, i.e. oriented in the same direction as the quadrant of the corresponding body position. Comparison circle 630 may be defined by two points: the center of Fig. 6A and the tip of a histogram bar 640. All histogram bars meet in the center of Fig. 6A. Comparison circle 630 reinforces the distance from the center of Fig. 6A to the top of histogram bar 640 for a given section. Comparison circle 630 may be used to make quick graphical "greater than" and "less than" comparisons between positions, as the circle extends into all quadrants, allowing a rapid comparison with the histogram bars in other quadrants.

**In the Claims:**

Claim 1. (cancelled)

Claim 2. (withdrawn) A method for displaying sleep related physiological information, the method comprising:

outputting an image of a spatial region having a first axis representing time and a second axis intersecting the first axis, the second axis representing at least an intensity measurement; and

outputting within the spatial region provided by the first axis and the second axis an envelope trace of sound associated with sleep, the envelope trace of sound including a plurality of graphical components within the envelope trace; each of the plurality of graphical components being associated with a determined time provided on the first axis representing time; whereupon at least one of the plurality of graphical components represents a degree of snoring during the determined time associated with the graphical component.

Claim 3. (withdrawn) The method of claim 2 wherein the graphical components are areas of substantially uniform color or texture pattern having borders substantially perpendicular to the first axis.

Claim 4. (withdrawn) The method of claim 2 wherein the graphical components have an upper border substantially conforming to the envelope trace.

Claim 5. (withdrawn) The method of claim 4 wherein the graphical components have a lower border substantially conforming to a baseline of the envelope trace.

Claim 6. (withdrawn) The method of claim 2 wherein the graphical components have a lower border substantially conforming to a baseline of the envelope trace.

Claim 7. (withdrawn) The method of claim 2 wherein each of a plurality of graphical components has an associated visible color, a characteristic of the visible color being indicative of a degree of snoring.

Claim 8. (withdrawn) The method of claim 7 wherein at least three visually distinguishable colors are present in the spatial region, each of the visually distinguishable colors being associated with at least a graphical component in the spatial region.

Claim 9. (withdrawn) The method of claim 2 wherein a plurality of the graphical components have an associated determined time of duration less than or equal to one-half second.

Claim 10. (withdrawn) A method for displaying physiological information associated with a sleep period of a mammal, the method comprising:

outputting an image of a spatial region having a first axis representing a time interval associated with the sleep period, and a second axis intersecting the first axis, the second axis representing at least an intensity measurement;

outputting within the spatial region provided by the first axis and the second axis an envelope trace of respiratory sound associated with the mammal during the time interval;  
and

outputting within the spatial region provided by the first axis and the second axis a first plurality of graphical components, each of the first plurality of graphical components

being associated with a determined time period provided on the first axis representing time, whereupon:

at least one of the first plurality of graphical components represents a degree of snoring during the determined time associated with the graphical component, the representation of snoring deriving from a color or texture pattern of the graphical component; and

each of the first plurality of graphical components has a top border that substantially conforms to the envelope trace and side borders that are substantially perpendicular to the first axis or substantially conform to the envelope trace.

Claim 11. (withdrawn) The method of claim 10 wherein a greater degree of color saturation or a greater degree of color darkness of a graphical component is indicative of a greater degree of snoring by the mammal during the determined time associated with the graphical component.

Claim 12. (withdrawn) The method of claim 10 wherein the duration of the determined time period of a graphical component is less than or equal to the duration of an inhalation by the mammal.

Claim 13. (withdrawn) The method of claim 10 wherein the duration of the determined time period of a graphical component is less than or equal to one second.

Claim 14. (withdrawn) The method of claim 10 further comprising outputting within the spatial region provided by the first axis and the second axis a second plurality of graphical components, each of the second plurality of graphical components being

associated with a determined time period provided on the first axis representing time, whereupon:

at least one of the second plurality of graphical components represents a limb movement by the mammal during the determined time associated with the graphical component; and

each of the second plurality of graphical components has a substantially rectangular shape, with side borders substantially perpendicular to the first axis, top border substantially at the maximum extent of the second axis, and bottom border substantially at the minimum extent of the second axis.

Claim 15. (withdrawn) The method of claim 14 further comprising outputting within the spatial region provided by the first axis and second axis a third plurality of graphical components, each of the third plurality of graphical components being associated with a determined time period on the first axis representing time, whereupon:

at least one of the third plurality of graphical components represents a body position of the mammal during the determined time associated with the graphical component; and

each of the third plurality of graphical components has substantially linear sub-components parallel to the first axis and positioned substantially between the maximum extent of the second axis and the minimum extent of the second axis.

Claim 16. (withdrawn) The method of claim 15 further comprising outputting within the spatial region provided by the first axis and second axis a fourth plurality of

graphical components, each of the fourth plurality of graphical components being associated with a determined time period on the first axis representing time, whereupon:

at least one of the fourth plurality of graphical components represents respiratory airflow of the mammal during the determined time associated with the graphical component; and

each of the fourth plurality of graphical components has a top border that is substantially parallel to the first axis at substantially the maximum extent of the second axis, has side borders that are substantially perpendicular to the first axis, and has a bottom border that substantially conforms to the envelope trace or is substantially at the minimum extent of the second axis.

Claim 17. (withdrawn) A method for displaying sleep related physiological information about a mammal, the method comprising:

outputting an image of a spatial region having a first axis representing time and a second axis intersecting the first axis, the second axis representing at least an intensity measurement;

outputting within the spatial region provided by the first axis and the second axis an envelope trace of sound associated with sleep; and

outputting within the spatial region provided by the first axis and the second axis a first plurality of graphical components, each of the first plurality of graphical components being associated with a determined time period provided on the first axis representing time, whereupon:

the extent, in a direction parallel to the second axis, of the first plurality of graphical components substantially overlaps the extent in said direction of the envelope trace;

each of the first plurality of graphical components is indicative of a first physiological parameter of the mammal during the determined time associated with each of the first plurality of graphical components; and

the first physiological parameter is selected from at least one selected from snoring, blood oxygen saturation, and body position.

Claim 18. (withdrawn) The method of claim 17, wherein the first physiological parameter is snoring.

Claim 19. (withdrawn) The method of claim 17 wherein the first physiological parameter is blood oxygen saturation.

Claim 20. (withdrawn) The method of claim 17, further comprising outputting within the spatial region provided by the first axis and the second axis a second plurality of graphical components, each of the second plurality of graphical components being associated with a determined time period provided on the first axis representing time, whereupon:

the extent, in a direction parallel to the second axis, of the second plurality of graphical components substantially overlaps the extent in said direction of the envelope trace;

each of the second plurality of graphical components is indicative of a second physiological parameter of the mammal during the determined

time associated with each of the second plurality of graphical components;  
and

the second physiological parameter is selected from at least one  
selected from snoring, blood oxygen saturation, body position, limb  
movement, respiratory effort, respiratory air flow

Claim 21. (withdrawn) The method of claim 20 wherein the first physiological  
parameter is snoring and the second physiological parameter is blood oxygen saturation.

Claim 22. (withdrawn) The method of claim 17 wherein the overlap is greater than  
75 percent.

Claim 23. (new) A method for characterizing a state of a patient, comprising:  
deriving a set of data values from respiratory sound information collected from the  
patient which is indicative of an intensity, level, or loudness of the respiratory sound over a  
period of time including a sleep period of the patient;

determining from the respiratory sound information whether the patient is snoring  
during various time intervals within the period of time;

plotting the set of data values against a time axis; and

plotting a representation of whether the patient is snoring during the various time  
intervals against the same axis, the representation comprising a plurality of visually  
distinguishable graphical components, each of which is associated with a different time  
interval, wherein the plot of the set of data values and the plot of the representation of  
whether the patient is snoring are displayed on a single graph such that one overlays the  
other.

Claim 24. (new) The method of claim 23 wherein the graphical components are areas of substantially uniform color or texture pattern having borders substantially perpendicular to the time axis.

Claim 25. (new) The method of claim 23 wherein the graphical components have an upper border substantially conforming to the plot of the data values.

Claim 26. (new) The method of claim 25 wherein the graphical components have a lower border substantially paralleling the time axis.

Claim 27. (new) The method of claim 23 wherein the graphical components have a lower border substantially paralleling the time axis.

Claim 28. (new) The method of claim 23 wherein each of the plurality of graphical components has an associated visible color, a characteristic of the visible color being indicative of a degree of snoring.

Claim 29. (new) The method of claim 28 wherein the number of visually distinguishable colors associated with the plurality of graphical components is at least three.

Claim 30. (new) The method of claim 23 wherein the duration of the time interval associated with each of the plurality of the graphical components is less than or equal to one-half second.

Claim 31. (new) A method for characterizing a state of a patient comprising:

outputting within a spatial region having a first axis and a second axis an envelope trace of respiratory sound associated with the patient during a time interval associated with a sleep period of the patient represented on the first axis, the envelope trace being indicative of a loudness, level, or intensity of the respiratory sound; and

outputting within the spatial region provided by the first axis and the second axis a first plurality of graphical components, each of the first plurality of graphical components being associated with a different time period provided on the first axis, at least one of the first plurality of graphical components representing a degree of snoring during the time period associated with the graphical component by the use of a color or texture pattern of the graphical component; and each of the first plurality of graphical components having a top border substantially conforming to the envelope trace and side borders that are substantially perpendicular to the first axis or substantially conforming to the envelope trace.

Claim 32. (new) The method of claim 31 wherein at least three different degrees of snoring are represented among the first plurality of graphical components.

Claim 33. (new) The method of claim 31 wherein the duration of the time period associated with each graphical component in the first plurality of graphical components is less than or equal to the duration of an inhalation by the patient.

Claim 34. (new) The method of claim 31 wherein the duration of the time period associated with a graphical component in the first plurality of graphical components is less than or equal to one second.

Claim 35. (new) The method of claim 31 further comprising outputting within the spatial region provided by the first axis and the second axis a second plurality of graphical components, each of the second plurality of graphical components being associated with a different time period provided on the first axis, at least one of the second plurality of graphical components representing a limb movement by the patient during the time period associated with the graphical component; and each of the second plurality of graphical components having a substantially rectangular shape, with side borders substantially perpendicular to the first axis, a top border substantially parallel to the first axis, and a bottom border substantially parallel to the first axis.

Claim 36. (new) The method of claim 35 wherein the top border of each of the second plurality of graphical components is substantially at the maximum extent of the second axis, and the bottom border of each of the second plurality of graphical components is substantially at the minimum extent of the second axis.

Claim 37. (new) The method of claim 35 further comprising outputting within the spatial region provided by the first axis and second axis a third plurality of graphical components, each of the third plurality of graphical components being associated with a different time period provided on the first axis, at least one of the third plurality of graphical components representing a body position of the patient during the time period associated with the graphical component; and each of the third plurality of graphical components having substantially linear sub-components parallel to the first axis and positioned substantially between the maximum extent of the second axis and the minimum extent of the second axis.

Claim 38. (new) The method of claim 37 further comprising outputting within the spatial region provided by the first axis and second axis a fourth plurality of graphical components, each of the fourth plurality of graphical components being associated with a different time period on the first axis, at least one of the fourth plurality of graphical components representing respiratory airflow of the patient during the time period associated with the graphical component; and each of the fourth plurality of graphical components having a top border that is substantially parallel to the first axis, side borders that are substantially perpendicular to the first axis, and a bottom border that substantially conforms to the envelope trace or is substantially at the minimum extent of the second axis.

Claim 39. (new) The method of claim 31 further comprising outputting within the spatial region provided by the first axis and the second axis a second plurality of graphical components, each of the second plurality of graphical components being associated with a different time period provided on the first axis, and each of the second plurality of graphical components being indicative of a value of a physiological parameter during the time period associated with the graphical component, the physiological parameter being selected from blood oxygen saturation, body position, limb movement, and airflow.

Claim 40. (new) A computer readable medium having embodied thereon a program, the program being executable by a processor for performing a method for characterizing a state of a patient, the method comprising:

outputting within a spatial region having a first axis and a second axis an envelope trace of respiratory sound associated with the patient during a time interval associated with a sleep period of the patient represented on the first axis, the envelope trace being indicative of a loudness, level, or intensity of the respiratory sound; and

outputting within the spatial region provided by the first axis and the second axis a first plurality of graphical components, each of the first plurality of graphical components being associated with a different time period provided on the first axis, at least one of the first plurality of graphical components representing a degree of snoring during the time period associated with the graphical component by the use of a color or texture pattern of the graphical component; and each of the first plurality of graphical components having a top border substantially conforming to the envelope trace and side borders that are substantially perpendicular to the first axis or substantially conforming to the envelope trace.

Claim 41. (new) The computer readable medium of claim 40 wherein the method further comprises outputting within the spatial region provided by the first axis and the second axis a second plurality of graphical components, each of the second plurality of graphical components being associated with a different time period provided on the first axis, at least one of the second plurality of graphical components representing a limb movement by the patient during the time period associated with the graphical component; and each of the second plurality of graphical components having a substantially rectangular shape, with side borders substantially perpendicular to the first axis, a top border substantially parallel to the first axis, and a bottom border substantially parallel to the first axis.

Claim 42. (new) The computer readable medium of claim 41 wherein the method further comprises outputting within the spatial region provided by the first axis and second axis a third plurality of graphical components, each of the third plurality of graphical components being associated with a different time period provided on the first axis, at least

one of the third plurality of graphical components representing a body position of the patient during the time period associated with the graphical component; and each of the third plurality of graphical components having substantially linear sub-components parallel to the first axis and positioned substantially between the maximum extent of the second axis and the minimum extent of the second axis.

Claim 43. (new) The computer readable medium of claim 40 wherein the method further comprises outputting within the spatial region provided by the first axis and the second axis a second plurality of graphical components, each of the second plurality of graphical components being associated with a different time period provided on the first axis, and each of the second plurality of graphical components being indicative of a value of a physiological parameter during the time period associated with the graphical component, the physiological parameter being selected from blood oxygen saturation, body position, limb movement, and airflow.

## **REMARKS**

### **Amendment to the Specification**

The present amendment to the specification corrects certain typographical errors, refines phrasing, and updates references to a co-pending patent application. As above, these amendments, with one exception, were previously submitted on May 7, 2006. No new matter is introduced through these amendments.

### **Amendments to the Drawings**

Replacement versions of Figures 4A and 5 were previously submitted on May 7, 2006, in color hardcopy form, in triplicate. Certain features of the invention are more easily perceived in Figures 4A and 5 when viewed in color than when color is omitted. The specification describes color features of Figure 4A in paragraphs 42-45 and elsewhere. Color features of Figure 5 are included in paragraphs 62-63 and elsewhere.

No new matter is being introduced through these amendments. Furthermore, color versions of these figures were provided on CD-ROM at the time of submission.

### **Amendments to the Claims**

1. Claim 1 has been cancelled.
2. Applicants respectfully traverse the finding of the Examiner in the August 1, 2006 communication that claims 2-22 are directed to an invention that is independent or distinct from the invention originally claimed. In fact, in the next paragraph, the Examiner

states that claims 2-22 are drawn to an entirely different embodiment, thus implying that they represent a different embodiment of the same invention. Nonetheless, claims 2-22 have been withdrawn, replaced by claims 23-43, and will be resubmitted in a divisional application.

3. Claims 23-43 have been added to more particularly define the invention in a patentable manner over the cited background art.

### **Status of the Claims and General Summary of Claim Rejections**

Claim 1 was rejected under 35 U.S.C. §102(b) as being anticipated by US Patent No. 6,120,441 to Griebel (hereinafter referred to as Griebel).

#### **35 U.S.C. § 102(b) Rejections per Griebel**

Claim 1 was rejected under 35 U.S.C. §102(b) as being anticipated by US Patent No. 6,120,441 to Griebel. Applicants respectively traverse this rejection.

Griebel teaches a display of information in which a plurality of physiological parameters are plotted against substantially the same time axis but on different graphs against completely different parameter axes. In his figures 1a and 1b, a first physiological parameter derived from respiratory sound is plotted on a first graph ("Snor"). A second graph of a different physiological parameter ("Flow") is located below the first plot, and this second graph contains a vertical axis which is completely independent from that in the "Snor" graph. The remaining graphs of other parameters are also separate and similarly use vertical axes which are independent.

Claims 23-43 have been added to more distinctly define and patentably claim the invention over the cited art. Claims 23-43 claim an invention for compactly representing information related to a plurality of physiological parameters, by presenting all of the information on a single graph having a single time axis and also a single vertical axis. As presently presented, claim 23 recites, in part: plotting the set of data values against a time axis; and plotting a representation of whether the patient is snoring during the various time intervals against the same axis, the representation comprising a plurality of visually distinguishable graphical components, each of which is associated with a different time interval, wherein the plot of the set of data values and the plot of the representation of whether the patient is snoring are displayed on a single graph such that one overlays the other.

Claims 23-43 distinguish over Griebel because Griebel does not teach overlaying on a single graph having information related to snoring with any other data values representative of any other physiological parameters by plotting all of them on a single vertical axis. Fig. 1a and Fig. 1b of Griebel show that each physiological parameter is plotted against its own vertical axis. This is not a compact representation because there is no overlap between the plots for different parameters in the vertical dimension.

A challenge associated with compactly representing multi-parameter data is to design a method (or methods) of overlapping information representation of a plurality of parameters in such a way that clarity of each parameter's information remains acceptable. It is apparent from inspection of Fig. 1a and Fig. 1b in Griebel that simply overlaying the plots of individual parameters would significantly degrade the clarity of the representations in the individual plot panes shown. Furthermore, Griebel does not address the desirability of compactly representing multi-parameter data in sleep medicine.

As noted, Claims 23-43 teach methods for compactly representing information related to a plurality of physiological parameters, and Griebel does not teach such methods. Thus, it is respectfully submitted that the rejection of claim 1 has been overcome.

## CONCLUSION

The Applicant respectfully requests the entry of the amendments to the specification and drawings as these amendments do not enter new subject matter into the disclosure.

The Applicant contends that the Examiner's 35 U.S.C. § 102(b) rejection based on Griebel is overcome in that this reference does not teach each and every limitation of the presently claimed invention.

All dependent claims of the present application are allowable by virtue of their dependence on (either directly or via an intermediate dependent claim) an allowable base claim.

While the Applicant believes a *Notice of Allowance* is now warranted, the Examiner is invited to contact the Applicant with any questions concerning the present application.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "John Sotos". The signature is fluid and cursive, with the first name "John" being more prominent than the last name "Sotos".

John Sotos  
Applicant  
1788 Oak Creek Dr. - Ste 415  
Palo Alto, CA 94304  
(650) 325 5675